

Apparent Changes in Abundance and Distribution of Birds in Denali National Park and Preserve

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Abstract

Charles Sheldon, Olaus Murie, Adolph Murie, and Joseph Dixon made observations of the bird life in the Denali National Park (Denali) region from 1906 to 1962 and reported their observations in various articles, books, and field notes. While Sheldon provided the first descriptions of this region's bird life, Joseph Dixon and Adolph Murie provided the most comprehensive descriptions of the region's bird life. To identify possible changes in Denali's bird life over the last century, I compared historic bird observations made by Joseph Dixon and Adolph Murie with con-

Figure 1. The tiny orange-crowned warbler is one of the most common warblers in Denali.

temporary bird observations made between 2001 and 2006 through several long-term monitoring programs in Denali and by long time Denali naturalists. My preliminary comparisons suggest that distribution and abundance of many species has changed within the last century. For instance, Dixon and Murie considered whimbrels as common and regular breeders in areas now dissected by the Denali Park road, but we rarely encountered whimbrels within 0.5 mile of the Denali Park road in the last 10 years. Further, Dixon and Murie rarely encountered orange-crowned warblers during the breeding season in Denali, but they were one of the most common species encountered on our standardized bird surveys in the last decade. Although direct comparisons between historic and contemporary observations are impossible due to methodological differences, my preliminary investigations suggest that historic observations are valuable for identifying apparent changes, building hypotheses to explore cause of change, and planning future studies of Denali's birdlife.

Introduction

Denali National Park and Preserve (Denali) sits at the geographic center of Alaska. Advancing and retreating glaciers formed the contemporary landscapes of Denali (Hooge *et al.* 2006), resulting in a diversity of habitats used by many species of birds. The landscapes of Denali are dynamic, and scientists expect that landscape scale changes in this region may accelerate as arctic and subarctic ecosystems respond to a warming climate (Chapin *et al.* 2005, Hooge *et al.* 2006).

Currently, at least 119 species of birds nest in Denali, including 28 resident and 91 migratory species. Adequately describing the abundance and distribution of birds that live in this region and monitoring their population trends is challenging due to the remoteness and vast size of Denali, and to limited funding opportunities. Early naturalists and scientists that explored the Mount McKinley National Park region described their travels and bird observations in a series of books and scientific papers (Sheldon 1909, 1930, Dixon 1938, O. Murie 1924 and A. Murie 1946, 1963). Together, the field notes and documents of these naturalists and scientists “afford a valuable faunal history” of this region (Murie 1946) and can help Denali’s scientists identify changes that have occurred since these earlier biological surveys and studies.

The saying that “a picture tells a thousand words” is clearly illustrated by the ongoing research projects comparing historic and contemporary photographs of glaciers and landscape patterns in Denali. These comparisons provide clear evidence that Denali’s glaciers and landscapes are changing. Unfortunately, comparing historic and contemporary bird observations is more difficult than comparing photographs of the same areas since the methods and terms to describe the abundance and distribution of birds has changed over time. However, used in the proper context, historic observations offer some insight into broad scale changes in Denali’s bird life over the last century. The purpose of this paper is to describe and compare the historic and contemporary observations of two species of birds in Denali, to describe some of the values and limitations of

historic data, and to explain why Denali’s contemporary bird monitoring programs are providing reliable information on actual, rather than apparent, changes in Denali’s birdlife.

Methods

The study area was limited to the northeastern portion of Denali, the area where most historic and many contemporary field studies have occurred. Historic observations are limited to those made by Dixon from May 19 to July 29, 1926 (accompanied by George Wright) and May 16 to August 31, 1932 (Dixon 1938) and by Murie over many years between 1922 and 1962 (Murie 1946, 1963). Contemporary observations are limited to Breeding Bird Surveys (BBS) conducted along the Denali Park road, the Denali off-road point transect surveys (PTS), and during other fieldwork conducted by the author and other long-time Denali naturalists between 2001 and 2006.

It is beyond the scope of this paper to compare changes in all species of birds between historic and contemporary times. Therefore, I limited this paper to two species that appeared to have changed in either their distribution or abundance between the two periods: whimbrel (*Numenius phaeopus*) and orange-crowned warbler (*Vermivora celata*). I did not include comparisons of historic and contemporary observations of trumpeter swan (*Cygnus buccinator*) or peregrine falcon (*Falco peregrinus*), two species that have increased both in numbers and in area occupied in Denali in the last four decades, because Dixon (1938) and Murie (1946, 1963) did not mention them in their respective accounts. Readers interested in learning more about trumpeter swans in Denali are referred to McIntyre (2006).

Results

Whimbrel

Whimbrels, previously known as Hudsonian curlew, are large, migratory shorebirds that nest on the tundra. They arrive in the Denali region in early May and depart in August. Whimbrels have a large decurved bill and unique vocalizations (loud, nerve-racking cries) (Dixon 1938); thus, they are difficult to confuse with other shorebird species of this region.

Historic observations. Dixon and Murie considered whimbrels as common breeding birds in Denali. Dixon (1938) found whimbrels “breeding in fair numbers on wet tundra areas in the higher passes of the Mount McKinley region between Savage River and Copper Mountain” and suggested that whimbrels “occur commonly and are regular breeders in the McKinley region”. Murie (1963) stated that the whimbrel was a “rather conspicuous nesting bird

Species that have decreased in abundance or shifted their distribution
American Golden Plover (<i>Pluvialis dominica</i>)
Red-necked Phalarope (<i>Phalaropus lobatus</i>)
Bank Swallow (<i>Riparia riparia</i>)
Northern Wheatear (<i>Oenanthe oenanthe</i>)
Lapland Longspur (<i>Calcarius lapponicus</i>)
Rusty Blackbird (<i>Euphagus carolinus</i>)
Species that have increased in abundance or shifted their distribution
Wilson's Snipe (<i>Gallinago delicata</i>)
Black-billed Magpie (<i>Pica hudsonia</i>)
Ruby-crowned Kinglet (<i>Regulus calendula</i>)
Savannah Sparrow (<i>Passerculus sandwichensis</i>)
Lincoln's Sparrow (<i>Melospiza lincolnii</i>)
Species that exhibited no change in abundance or distribution
Merlin (<i>Falco columbarius</i>)
Golden Eagle (<i>Aquila chrysaetos</i>)

Table 1. A sample of species that have either increased or decreased in abundance, shifted their distribution, or exhibited no change in abundance or distribution between historic observation (1922 to 1962) and contemporary observations (2001 to 2006) in Denali National Park and Preserve, Alaska.

in the low, rolling, open tundra, among sedge hummocks” and “along the [Denali Park] road it is often seen between Savage and Sanctuary rivers, and it has been seen quite often between East Fork and Toklat rivers, and from the Muldrow Glacier to Wonder Lake”.

Contemporary observations. Contemporary observations suggest that whimbrels are rarely encountered along the park road, except during early to mid-May in the Wonder Lake area. Between 2001 and 2006, we detected whimbrels two times during standardized BBS (two in 2001, one in 2002) and four times during the PTS. During the same time period, whimbrels were frequently observed between mile 80 and 82 along the Denali Park road, but they moved away from the park road after mid-May (during the nesting season) (F. Wittwer and S. Senner, personal communication). Several whimbrel colonies were encountered along the Sanctuary River and east of the Denali Park road near mile 80, but both colonies were more than 0.5 miles from and out of sight of the Denali Park road.

Orange-crowned Warbler

Orange-crowned warblers (Figure 1) are tiny, greenish-yellow songbirds that arrive in Denali from mid to late May and depart from mid-August to early September. They lack wing bars and have a unique high-pitched trilling call. It is difficult to confuse orange-crowned warblers with other warbler species that occur in this region.

Historic observations. Dixon and Murie considered orange-crowned warblers as migrants that passed through the area, but that did not breed in Denali. Dixon (1938) stated that “Our experience both in 1926 and in 1932 leads us to believe that the orange-crowned warbler which Wright saw in a spruce wood on Savage River on May 21, 1926, at 2,800 feet altitude, was merely a late migrant passing through the McKinley region to its breeding ground farther north in the Yukon Valley. Repeated search in the McKinley region, both in 1926 and

in 1932, failed to reveal any breeding birds of this species in the park in summer.” Further, Murie (1963) did not list orange-crowned warblers as a breeding species in Denali; rather, he stated that this species was “noted in May and June, and in August, during migration” and “has been reported to nest rather commonly on the lower Yukon River”.

Contemporary observations. Contemporary observations suggest that orange-crowned warblers are one of the most common warbler species in Denali, and that they are common breeders. Between 2001 and 2006, we encountered 73 to 174 orange-crowned warblers annually on the BBS routes and 21 to 189 orange-crowned warblers annually on the PTS. Additionally, orange-crowned warblers, including many young of the year, were one of the most commonly captured warblers at constant-effort mist netting stations operated in Denali from 1993 to 2001 (DeSante et al. 2002) and at the Denali Institute Migration Station operated on Camp Denali property from 1998 to 2005 (Phillips 2006).



Photo courtesy of Ken Whitten

Orange-crowned warbler.

Discussion and Conclusions

It is beyond the scope of this paper to determine the magnitude of change and factors driving the changes in Denali’s bird life. Rather, the purpose of this paper is to provide a brief summary of some of my initial investigations and comparisons. By comparing historic and contemporary observations of whimbrel and orange-crowned warblers, I found multiple sources of evidence to suggest that either the distribution or abundance of these species has changed in the study area. In response, I explored the scientific

literature to determine the population status of whimbrel and orange-crowned warblers in Interior Alaska during the period from 1926 to 1963. Unfortunately, these efforts revealed little in regards to these species during that period. For instance, there are no data available to determine if orange-crowned warblers were less common in Alaska during the period from 1926 to 1963; however, Gabrielson and Lincoln (1959) suggest that orange-crowned warblers were commonly encountered in other regions of interior Alaska during this period. Further, the U.S. Shorebird Conservation Plan lists whimbrel as a “Species of High Concern,” based on population trend, relative abundance, threats on non-breeding grounds, and non-breeding distribution.

While my preliminary investigations suggest that at least two species have substantially changed their distribution or abundance in the last century, I found evidence to suggest that other species have changed as well (Table 1). It is beyond the scope of this paper to describe results of all my comparisons, but these findings suggest that more research is clearly warranted to determine how Denali bird life changes over time.

Management Implications

Birds are an important component of Denali’s ecosystems; their high body temperature, rapid metabolism, and high ecological position in most food webs make them a good indicator of the effects of local and regional changes in ecosystems (Fancy and Sauer 2000). Detecting changes in the abundance and distribution of birds in Denali is difficult due to the large size, remote nature, and diversity of habitats of the park and preserve. Despite these challenges, we are starting to gain a better understanding of the diversity, abundance, and distribution of birds living in Denali through many projects and long-term

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observations. While historic observations are useful for identifying apparent change, our contemporary bird monitoring programs are designed to detect actual, rather than apparent, change. Most important are our long-term monitoring projects of golden eagles and passerine birds conducted through the Central Alaska Network Vital Signs Monitoring Program (MacCluskie and Oakley 2005) and the U.S. Fish and Wildlife Service's trumpeter swan surveys (McIntyre 2006). These long-term data sets, based on robust and repeatable methodologies, provide reliable information that will allow Denali's scientists and managers to detect changes in different species in Denali and develop programs to investigate factors driving the changes. Moreover, because Denali's ongoing passerine monitoring program is integrated with vegetation, soil, and permafrost monitoring, we can explore how birds respond to changes in the landscape and delineate relationships among physical and biological elements in Denali (Roland and McIntyre 2006). As a result, our contemporary bird monitoring programs are establishing foundations for effective long-term monitoring of park resources that will allow us to better understand and manage these resources in the future (Roland and McIntyre 2006).

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